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SEP 21 2007

Amendments to the Drawings

A replacement sheet of drawings for Figure 3 and new sheets of drawings for Figs. 5A and 6A are attached hereto as **Exhibit A**.

Figure 3 has been amended to remove the arrow from the line exiting (to the right of) control device 40.

Fig. 5A is substantially identical to Fig. 5, except that the r13 pixel has been changed to 0 and the r22 pixel has been changed to 1. Support for Fig. 5A can be found in the application at page 19, line 24 through page 20, line 5, as originally filed.

Fig. 6A is substantially identical to Fig. 6, except that (i) the numbers to the left of labels f1 through f8 represent sums (instead of logical ORs) of the coefficients in each scanning line, and (ii) such numbers are summed to yield the total of 28. Support for Fig. 6A can be found in the application at page 10, lines 7-15 and page 25, lines 6-10, as originally filed.

Attachment: replacement sheet of drawings for Figure 3;
new sheets of drawings for Figs. 5A and 6A

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REMARKS

The application has been reviewed in light of the Office Action dated July 2, 2007. Claims 1-37 were pending. By this Amendment, claims 1, 4-8, 12, 15, 16-19, 23-36 have been amended to clarify the claimed subject matter, new claim 38 has been added, and claim 37 has been canceled, without prejudice or disclaimer. Accordingly, claims 1-36 and 38 are now pending, with claims 1, 12, 23, 29, 35 and 36 being in independent form.

The specification was objected to as having informalities. The drawings were objected to under 37 CFR 1.83(a). Claims 1-37 were rejected under 35 U.S.C. §112, first paragraph, as allegedly not supported by an enabling disclosure. Claims 1-37 were rejected under 35 U.S.C. §112, second paragraph, as purportedly indefinite. Claims 29-36 were rejected under 35 U.S.C. §101 as purportedly directed to non-statutory subject matter.

The drawings, specification and claims of this application have been reviewed and amended to address issues noted in the Office Action.

The Office Action states that various claim terms are purportedly not explained in sufficiently full, clear and exact terms in the specification.

Before terms are addressed in turn below, the disclosure is considered as a whole, in order to place the terms in the proper context. The present application relates to information compression technology (such as for digital image compression, sound compression, etc.). In information compression it is typically an objective to reduce an amount of coding by highlighting, grouping (such as through quantization) and/or otherwise retaining information directed to features of interest, while omitting or minimizing information not of interest.

The subject matter of the claims of the present application processes coefficients output

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by a DCT (discrete cosine transform) frequency conversion algorithm which performs a quantization process (that is, the coefficients represent quantized data). In such circumstances, coefficients that are 0 in value are not of interest and each such coefficient is referenced in the application as an "invalid coefficient". On the other hand, each of the other coefficients (that is, do not have 0 as a value) represent valid coefficients (that is, information of interest). In the subject matter of claim 1 of the present application, certain predetermined valid coefficients (for example, value of 1) are modified to invalid coefficients (for example, value of 0), in order to further compress the information.

In addition, information regarding valid coefficients can be considered and processed in any or a combination of multiples ways. As a first example, the number of valid coefficients in the quantized data can be determined, to address a concern of how much compression can be performed. As a second example, a magnitude of the valid coefficients can be considered, individually and/or summed together, such as to quantify volume of information. In each of the first and second examples, the spatial relationship or addressing of coefficients can be factored into the approach to make the processing more efficient. The subject matter of the claims of this application embodies advantages derived from applicant's recognition of such factors.

Scanning and searching

Applicant submits that it would have been understood by one skilled in the art reading the disclosure as originally filed that "scanning" refers to the *order or direction* in which coefficients are considered in turn and processed and "searching" refers to the operation of looking for specific *content (that is, valid coefficient)*.

Such operations are represented in the drawings. For example, scanning operations are

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represented by the arrows (and lines attached thereto) in Fig. 5. Searching operations are controlled by search control device 24 in Fig. 2. In addition, step S103 illustrated in Fig. 4 represents a determination, in the search, of whether a particular block register stores a valid coefficient.

In addition, paragraph [0059] on page 18 of the specification as originally filed states in relevant part as follows:

"Referring now to Fig. 5, the 8 times 8 pixel block register 21 is *inversely zigzag scanned* to *search valid coefficients*. In a conventional JPEG algorithm, Huffman coding is performed in accordance with a *zigzag scan order* (i.e., *in a forward direction*) shown in Fig. 1. ..."

As another example, paragraph [0029] on pages 8 and 9 of the specification as originally filed states in relevant part as follows:

[0029] ... The performing step performs an *inverse zigzag scan for scanning* the block register to *search a valid coefficient*. ... The continuously performing step performs the *inverse zigzag scan* when the number of *searched coefficients* counted in the counting step is smaller than the collection level in the presetting step. ...

Thus, the lines and arrows illustrated in Fig. 5 indicates, as an example, a scan order in an inversely zigzagging manner, to search for a valid coefficient in the 8 times 8 block register.

Accordingly, it is abundantly clear when reading claim 1 in the context of the disclosure as originally filed that scanning and searching are connected in that the search operation is performed to look for specific content (that is, valid coefficient) and a scanning operation specifies the order in which blocks will be considered in turn for such search operation.

Further, it should be noted that scanning is not limited to inversely zigzag scan nor that the scanning limits the searching to one register at a time (see, for example, Figs. 6 and 7 wherein a logical OR is performed to multiple registers).

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First and second control devices or mechanisms and Presearching

First and second control mechanisms in claim 4, are represented in Fig. 3 by search control device 24 and control device 40, respectively. While the control device 40 is not expressly referenced in the specification as "second control device" or "second control mechanism", applicant submits that it is abundantly clear from Fig. 3 and the specification (see, for example, paragraphs [0083], [0085] and [0095]) that the control device 40 receives and presearches quantized data output from the quantization execution module. Such presearching can enable the control device 40 to determine that the search control device 24 should start the search for valid coefficients, in an appropriate scanning operation, such as an inverse zigzag scan, block register nets, etc. Use of the second control device results in a reduction of processing time, in that the apparatus does not wait for the control device 24 to recognize, on its own, that the coefficients have been fully loaded in the block registers and that scanning should begin.

Isolated valid coefficient

Regarding "isolated value coefficient" referenced in the Office Action, it is submitted that such term does not appear in the application as originally filed. On the other hand, "isolated valid coefficient" is referenced repeatedly in the specification. As noted above, it is generally desired in information compression to group information of interest together. This concept is further described in the specification at, for example, page 19, lines 24 through page 20, line 9.

Quantization table

Regarding use of a quantization table to locate the point in a 8 times 8 block where a valid coefficient exists, it is noted that the quantization table embodies the association between

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quantized data and coefficients. One skilled in the art would appreciate that when the quantization is large (and therefore there are less codes), the high frequency component will typically include mostly invalid coefficients (that is, 0). Further it is noted that claim 1 refers to "block registers which store block-based multi-bit quantized data converted from information output from a quantization execution module".

Other claim features

Other claim features referenced in the Office Action are adequately depicted in the drawings and/or are supported by other parts of the disclosure as originally filed, as well:

for claim 5 and 26, address moving of the valid coefficient is represented in Fig. 5A;

for claim 23, performing an inverse zigzag scan is shown in, for example, Fig. 5, searching for a valid coefficient is shown in, for example, Fig. 4 (S103), continuously performing the inverse zigzag scan is shown in, for example, Fig. 4 (combination of S105 and S103), counting a number of searched valid coefficients is shown in, for example, Fig. 4 (S104), modifying a subsequent searched valid coefficient to the invalid coefficient is shown in, for example, Fig. 4 (S104 performed a second time);

for claim 24, when a valid coefficient is modified is shown in, for example, Fig. 4 (S104);

for claim 25, presearching is shown in, for example, Fig. 3 (element 40); and calculating step in claim 27 and summing step in claim 28 are shown in, for example, Fig. 6A; and

regarding connection of the nets. Fig. 7 clearly shows how block register nets f9 to

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f15 can be connected a logical OR can be performed to the coefficients in the nets
f9 to f15.

Withdrawal of the objection to the specification, the objection to the drawings, the rejections under 35 U.S.C. §112 and the rejection under 35 U.S.C. §101 is respectfully requested.

Claims 1-3, 9, 10, 12-14, 20 and 21 were rejected under 35 U.S.C. § 102(e) as purportedly anticipated by Mukherjee (U.S. 2003/0123740 A1). Claims 4, 15 and 23-25 were rejected under 35 U.S.C. § 103(a) as purportedly unpatentable over Mukherjee in view of U.S. Patent No. 5,793,893 to Kim. Claims 29-31 and 35 and 37 were rejected under 35 U.S.C. § 103(a) as purportedly unpatentable over Mukherjee in view of Kim. Claims 11 and 22 were rejected under U.S.C. § 103(a) as purportedly unpatentable over Mukherjee in view of U.S. Patent No. 6,460,061 to Dick. Claim 36 is rejected under U.S.C. § 103(a) as purportedly unpatentable over Mukherjee in view of Kim and in further view of Dick.

Applicant has carefully considered the Examiner's comments and the cited art, and respectfully submits that independent claims 1, 12, 23, 29, 35 and 36 are patentable over the cited art, for at least the following reasons.

As noted above, the present application relates to information compression wherein a selected number of valid coefficients are modified to be invalid coefficients, to enable further compression.

For example, claim 1 of the present application is directed to an information compression apparatus comprising a correction level register which presets a correction level indicating a degree of data correction. Valid coefficient are modified to invalid coefficients until the number of modifications reaches the correction level preset in the correction level register.

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Mukherjee, which is the primary reference cited in the Office Action, does not teach or suggest such an approach (that is, as provided by the subject matter of claim 1 of the present application).

Mukherjee, as understood by applicant, proposes an approach for compressing images of arbitrarily shaped objects including classifying each pixel within a selected block of pixels as relevant or irrelevant, applying a forward transform to the selected block to generate a coefficient block, modifying the coefficient values to generate a modified coefficient block subject to a set of pre-determined constraints including a constraint that the relevant pixels have a same value in an inverse transformation of the modified coefficient block as in the selected block, and repeating for other coefficients having non-zero quantized values, in a reverse zig zag coefficient order.

Mukherjee, [0079], which was cited in the Office Action, states as follows:

[0079] The optimization process repeats steps 740-780 until all non-zero quantized coefficients have been processed or until the energy of the result exceeds the pre-determined threshold.

Thus, Mukherjee proposes that coefficient values are modified until all non-zero quantized coefficients have been processed or until the energy of the result exceeds the pre-determined threshold.

However, such threshold corresponds to a specified energy level, and not to a specific number of corrections or modifications to the coefficients.

Mukherjee and the other cited references simply do not teach or suggest an information compression wherein a selected number of valid coefficients are modified to be invalid coefficients, as provided by the subject matter of claim 1 of the present application.

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Applicant does not find teaching or suggestion in the cited art of an information compression apparatus comprising a correction level register which presets a correction level indicating a degree of data correction, wherein valid coefficient are modified to invalid coefficients until the number of modifications reaches the correction level preset in the correction level register, as provided by the subject matter of claim 1 of the present application.

Independent claims 12, 23, 29, 35 and 36 are patentably distinct from the cited art for at least similar reasons.

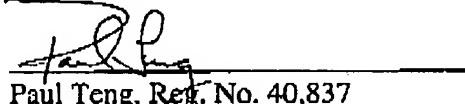
The Office Action indicates that claims 5-8, 16-19, 26-28 and 32-34 would be allowable if rewritten to overcome the rejections under 35 U.S.C. 112. However, since independent claims 1, 12, 23, 29, 35 and 36 are submitted to be patentable over the cited art, no changes to the form of claims 5-8, 16-19, 26-28 and 32-34 are believed to be necessary.

In view of the remarks hereinabove, Applicant submits that the application is now in condition for allowance, and earnestly solicits the allowance of the application.

If a petition for an extension of time is required to make this response timely, this paper should be considered to be such a petition. The Patent Office is hereby authorized to charge any fees that are required, and to credit any overpayment, to our Deposit Account No. 03-3125.

If a telephone interview could advance the prosecution of this application, the Examiner is respectfully requested to call the undersigned attorney.

Respectfully submitted,


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